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SCIENCE

A WEEKLY JOURNAL DEVOTED TO THE ADVANCEMENT OF SCIENCE, PUBLISHING THE
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FRIDAY, JUNE 28, 1901.

RELATIONS OF THE NATIONAL GOVERN-
MENT TO HIGHER EDUCATION AND
RESEARCH.*

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MSS. intended for publication and books, etc., intended for review should be sent to the responsible editor, Professor J. McKeen Cattell, Garrison-on-Hudson, N. Y.

WHEN one considers the relations of the General Government to higher education and research, probably the first question to arise is, What, within the limitations imposed by the Constitution, can the Government do? Other pertinent inquiries are: What has been done? What is the present policy of the Government? How are its educational resources being utilized? What can be done that is not already being well done by our universities, colleges and technical institutions?

Many of our wisest and best statesmen and jurists believe that the General Government has no power, under the Constitution, to appropriate money for educational purposes, that important function having been left to the States. A glance backward over the history of colonial and national discussion and legislation is interesting and instructive.

HISTORY OF COLONIAL AND NATIONAL DISCUSSION.

In colonial times Oxford, Cambridge and Edinburgh were to American youth the centers of learning and higher education. These famous universities furnished all that

*Substance of address before the University of Chicago, delivered June 17, 1901.

was needed by the well-to-do student, and local colleges were given little attention and scant support. The founders of our college system were obliged to meet adverse conditions which developed the same qualities that led their compatriots to the conquest of the continent.

Early in the seventeenth century (1619) the Virginia Company granted ten thousand acres of land 'for the foundation of a seminary of learning for the English in Virginia.' At the suggestion of the King, the bishops of England, in the same year, raised fifteen hundred pounds to aid in the education of the Indians in connection with the proposed grant of land for the seminary. A portion of the land was occupied and the seminary was started under the direction of George Thorpe, a man of high standing in England. But the institution was short-lived. It, with its inmates and founder, perished in the Indian massacre of 1622.

In 1624 an island in the Susquehanna river was granted for the founding and maintenance of a university, but the undertaking lapsed with the death of its projector and of James I. and the fall of the Virginia Company.

For a time the movement for higher education was delayed, but in 1636 Harvard was founded; then William and Mary, in 1660; Yale, in 1701; the College of New Jersey, in 1746; the University of Pennsylvania, in 1751; Columbia, in 1754; Brown, in 1764; Dartmouth, in 1769; the University of Maryland, in 1784; the University of North Carolina, in 1789-'95; the University of Vermont, in 1791, and Bowdoin, in 1794.

The university spirit was well developed when the Constitutional Convention met in 1787. Madison, who was a member of the convention, acting in harmony with the known wishes of Washington, proposed to give the National Legislature power—

To establish a university.

To encourage, by premiums and provisions, the advancement of useful knowledge and the discussion of science.

Charles Pinckney also earnestly advocated a plan for the establishment of a national university, and Mr. Wilson supported the motion; but the matter was dropped, on the ground that Congress already had sufficient power to enact laws for the support of national education.

John Adams, who agreed with Washington in believing that 'scientific institutions are the best lasting protection of a popular government,' was always a strong advocate of the promotion of intelligence among the people. He secured the insertion in the constitution of Massachusetts of a provision recognizing the obligation of a State to pursue a higher and broader policy than the mere protection of the temporal interests and political rights of the individual. This provision read as follows :

It shall be the duty of legislatures and magistrates in all future periods of this Commonwealth, to cherish the interests of literature and the sciences * * * to encourage private societies, and public institutions, rewards and immunities for the promotion of agriculture, arts, sciences, commerce, trades, manufactures, and a natural history of the country.*

Washington sought to impress on Congress and the people his earnest conviction that the Government should establish and support a great national university. To this end he made a bequest in his will, and if Congress had treated it as the Legislature of Virginia treated his bequest for the endowment of Washington College, there would be to-day a fund sufficient to give adequate support to a great institution for investigation and original research in the capital city. In his will Washington expressed the fears he entertained as to the effect of foreign education on the youth of America, and the desirability of having an American university. His language was as follows :

* Massachusetts Public Statutes, 1882, p. 34.

That as it has always been a source of serious regret with me to see the youth of these United States sent to foreign countries for the purpose of education, often before their minds are formed, or they have imbibed any adequate ideas of the happiness of their own, contracting too frequently not only habits of dissipation and extravagance, but principles unfriendly to republican government, and to the true and genuine liberties of mankind, which thereafter are rarely overcome. For these reasons it has been my ardent wish to see a plan devised on a liberal scale which would have a tendency to spread systematic ideas through all parts of this rising empire, thereby to do away with local attachments and State prejudices, as far as the nature of things would, or indeed, ought to admit, from our national councils. Looking anxiously forward to the accomplishment of so desirable an object as this is (in my estimation), my mind has not been able to contemplate any plan more likely to effect the measure than the establishment of a university in a central part of the United States, to which the youth of fortune and talents from all parts thereof might be sent for the completion of their education in all the branches of polite literature, in arts, and sciences, in acquiring knowledge in the principles of politics and good government, and (as a matter of infinite importance, in my judgment), by associating with each other, and forming friendships in juvenile years, be enabled to free themselves in a proper degree from those local prejudices and habitual jealousies which have just been mentioned, and which when carried to excess are never-failing sources of disquietude to the public mind, and pregnant of mischievous consequences to this country.

Madison, though defeated in his effort to secure the approval of the Constitutional Convention in respect to the establishment of a national university, did not fail, when President, to call the attention of Congress to the subject. In his second annual message he said :

I cannot presume it to be unreasonable to invite your attention to the advantages of superadding to the means of education provided by the several States a seminary of learning instituted by the national legislature, within the limits of their exclusive jurisdiction, the expense of which might be defrayed or reimbursed out of the vacant grounds which have accrued to the nation within those limits. (*Annals of Congress*, 1810, '11, '13.)*

* 'The History of Federal and State Aid to Higher Education in the United States,' by Frank W. Black-

mar. Various other attempts have been made from time to time to establish a national university. Blackmar says :

In 1796 a proposition was before Congress in the form of a memorial praying for the foundation of a university. (*Ex. Doc.*, 4th Congress, 2d session.)

Again, in 1811 a committee was appointed by Congress to report on the question of the establishment of a seminary of learning by the National Legislature. The committee reported unfavorably, deeming it unconstitutional for the Government to found, endow and control the proposed seminary. (*Ex. Doc.*, 11th Congress, 3d session.)

In 1816 another committee was appointed to consider the same subject, and again the scheme failed. (*Ex. Doc.*, 14th Congress, 2d session.)*

When the disposition of the Smithsonian fund was under consideration (1838-1846), the subject of founding a national university was fully and freely discussed, and the plan was rejected by Congress.

Again in 1873 the matter was revived by the Hon. J. W. Hoyt, who from that time onward never ceased to labor diligently for a national university. Largely owing to his zeal and activity a committee of 100 was formed, various bills were introduced in Congress and a Senate Committee was created to establish a national university. But Congress always looked on the scheme with suspicion and not one of the various bills offered was ever acted upon by the Senate or House of Representatives.

The trend of opinion has been and is that the Government should not found a national university in the sense suggested by Washington and his followers. The Congress has, however, generously aided technical and higher education by grants of land to States and Territories for educational purposes.

The policy was inaugurated under the general authority of the famous Ordinance of July 13, 1787. Conformably thereto a

mar, Ph.D. : Bureau of Education, Contributions to American Educational History, edited by Herbert B. Adams, No. 9, 1890, p. 32.

* *Op. cit.*, pp. 39, 40.

contract was entered into between the Ohio Company and the Board of Treasury of the United States, on the 27th of July, 1787, whereby lot 16 in every township was given for the maintenance of public schools and not more than two complete townships were given perpetually for the purpose of a university, the land to be applied to the purpose by the legislature of the State.*

The most important act, after that of 1787, was that of 1862, granting land for the endowment of colleges for teaching agriculture and the mechanical arts. It is to be noted that by this act the responsibility was thrown entirely upon the States, and that, so far as the administration of the fund was concerned, it was State, not national, education.

The total grants of lands aggregate about 13,000,000 acres, or 20,000 square miles. Of this 2,500,000 acres, or 4,000 square miles, were for the establishment of higher institutions of learning. This land, divided among thirty States and Territories, gives an average of a little more than 80,000 acres, or about 130 square miles. For technical schools, called 'Colleges for the benefit of agriculture and the mechanical arts,' Congress has granted to forty-five States 10,500,000 acres, or about 16,000 square miles. This is an average of 230,000 acres, or about 360 square miles. Congress now grants annually to each of the forty-five States \$25,000,† a total of more than a million dollars, all of which is expended under the direction of State boards.

The Government maintains, and has maintained since 1802, an academy for training its army officers; also, since 1845,

* Bancroft, 'History of the Constitution,' N. Y., 1882, Vol. II., pp. 435, 436. Also Geo. B. Germann, 'National Legislation concerning Education,' New York, 1899, pp. 19, 20.

† Act approved August 30, 1890. Statutes at Large, Vol. 26, p. 417.

an academy for training its naval officers. The Government does not maintain and never has maintained any institution for training its civil officers.

The policy of the Government, as gathered from its acts, has been to relegate the direct control of education to the States, aiding them in this work by grants of land, and in the case of technical education by grants of money also.

PRESENT POLICY OF THE GOVERNMENT.

Turning, now, to the question, What is the present policy of the Government? we have just seen that aid is given by grants of land, and in the case of the experiment stations by grants of money. As to the use of its literary and scientific collections by students its policy was defined by a public resolution of Congress approved April 12, 1892, which reads as follows:

Whereas large collections illustrative of the various arts and sciences and facilitating literary and scientific research have been accumulated by the action of Congress through a series of years at the national capital; and

Whereas it was the original purpose of the Government thereby to promote research and the diffusion of knowledge, and it is now the settled policy and present practice of those charged with the care of these collections specially to encourage students who devote their time to the investigation and study of any branch of knowledge by allowing to them all proper use thereof; and

Whereas it is represented that the enumeration of these facilities and the formal statement of this policy will encourage the establishment and endowment of institutions of learning at the seat of Government, and promote the work of education by attracting students to avail themselves of the advantages aforesaid under the direction of competent instructors: Therefore,

Resolved, by the Senate and House of Representatives of the United States of America, in Congress assembled, That the facilities for research and illustration in the following and any other Governmental collections now existing or hereafter to be established in the city of Washington for the promotion of knowledge shall be accessible, under such rules and restrictions as the officers in charge of each collection may prescribe, subject to such authority as is now or may hereafter

be permitted by law, to the scientific investigators and to students of any institution of higher education now incorporated or hereafter to be incorporated under the laws of Congress or the District of Columbia, to wit:

- One. Of the Library of Congress.
- Two. Of the National Museum.
- Three. Of the Patent Office.
- Four. Of the Bureau of Education.
- Five. Of the Bureau of Ethnology.
- Six. Of the Army Medical Museum.
- Seven. Of the Department of Agriculture.
- Eight. Of the Fish Commission.
- Nine. Of the Botanic Gardens.
- Ten. Of the Coast and Geodetic Survey.
- Eleven. Of the Geological Survey.
- Twelve. Of the Naval Observatory.

The privileges of this act, it will be noted, are limited to scientific investigators and students of institutions incorporated under the laws of Congress or the District of Columbia. This limitation was removed by an act approved March 3, 1901, which reads as follows:

Joint resolution to facilitate the utilization of the Government Departments for the purposes of research, in extension of the policy enunciated by Congress in the joint resolution approved April 12, 1892.

WHEREAS * * *

Resolved, That facilities for study and research in the Government departments, the Library of Congress, the National Museum, the Zoological Park, the Bureau of Ethnology, the Fish Commission, the Botanic Gardens and similar institutions hereafter established shall be afforded to scientific investigators and to duly qualified individual students, and graduates of institutions of learning in the several States and Territories, as well as in the District of Columbia, under such rules and restrictions as the heads of the departments and bureaus mentioned may prescribe.

DISCUSSION AND ACTION IN RECENT YEARS.

Dr. Daniel C. Gilman, in 1897, summarized the situation in relation to the establishment of a national university, as follows:*

First, there is a strong desire, not only among the residents of the Federal city, but among the lovers and promoters of learning throughout the country, that the libraries, collections, instruments, and appa-

ratus belonging to the Government should be opened to students, not as a favor, nor by exception, nor as a passing entertainment, but for study and experiment, according to suitable regulations, and especially under the guidance of such able teachers as may be already engaged in the service of the Government, or may be enlisted hereafter for the particular offices of education. So far as this there would be a unanimous, or nearly unanimous, assent.

Second, the universities existing in Washington and near to it, including those of New England, would regard with disfavor, and probably with distrust, an effort to establish, by congressional action, the University of the United States. In some places there would be positive opposition. * * *

Third, outside of academic circles, as well as inside, there is a great distrust of the principle that Congress should provide for and direct university education. The fears may be foolish. It is easy to laugh at them. Apprehensions may be pronounced groundless; nevertheless it will be difficult to get rid of them. There will be an ever-present expectation of political interference, first in the governing body, then in the faculty, and finally in the subjects and methods of instruction. It is true that partisan entanglement may be avoided, but it will be difficult indeed to escape the thralldom.

In the same article it is suggested that the Smithsonian Institution take charge, so that—

The literary and scientific institutions of Washington may be associated and correlated so far, and so far only, as relates to the instruction and assistance, under proper restrictions, of qualified students. * * * Such a learned society may be developed more readily around the Smithsonian Institution, with less friction, less expense, less peril, and with the prospect of more permanent and widespread advantages to the country, than by a dozen denominational seminaries or one colossal University of the United States.

In February, 1899, Dr. William H. Dall, of the Geological Survey, outlined very clearly the conditions and possibilities for post-graduate work in Washington, and urged that if any organization was attempted it should be free from Government control.*

Little, if any, advantage was taken of the congressional resolution of 1892, which restricted opportunities for study and re-

* *Century Magazine*, November, 1897.

* *American Naturalist*, Vol. 33, pp. 97-107.

search to the educational organizations of the District of Columbia, but with the recent rapid growth of the Department of Agriculture, a considerable number of students have been given opportunity for study and practical training. Secretary Wilson has taken the lead in actually bringing qualified students into the laboratories of a Government department and setting them to work. He has inaugurated a new class, called 'student assistants,' and has demonstrated its practical value. In his report for 1898 he says :*

George Washington, by his will, left property to be devoted to university education in the District of Columbia. There is no university in the land where the young farmer may pursue post-graduate studies in all the sciences relating to production. The scientific divisions of the Department of Agriculture can, to some extent, provide post-graduate facilities. Our chiefs of division are very proficient in their lines ; our apparatus the best obtainable ; our libraries the most complete of any in the nation. We can direct the studies of a few bright young people in each division, and when the department requires help, as it often does, these young scientists will be obtainable.

They should be graduates of agricultural colleges and come to the Department of Agriculture through a system of examination that would bring the best and be fair to all applicants. The capacity of the department is limited, but something can be done that will indicate to Congress the value of the plan. The department often needs assistants to take the place of those who are tempted to accept higher salaries in State institutions. The opening of our laboratories to post-graduate work would provide an eligible list from which to fill vacancies as they occur, supply temporary agents, and be a source from which State institutions might get assistance in scientific lines.

The Department of Agriculture naturally turns to the professedly agricultural colleges for its student assistants, but if other institutions gave their students such instruction as would qualify them for the work of that department, there seems to be no good reason why they should be discriminated against.

* 'Yearbook of the Department of Agriculture,' 1898, pp. 18, 19.

As the development of the work progressed in the scientific bureaus, it became impossible to find men qualified for the permanent positions open to them. Graduate students were obtainable, but they were without practical training for the work. The Civil Service Commission was called on, but it had no eligibles on its lists. The only way out of the difficulty seemed to be for the heads of the scientific bureaus to select bright, well-educated young men and train them ; this they have been doing for several years. In the Geological Survey graduate students, being the best men available for temporary field assistants in both geologic and topographic work, are given preference. The Survey cooperates with such institutions of learning as are willing to give the advanced instruction necessary to fit students to engage in the several special lines of investigation. This cooperation consists mainly in the employment of graduate students and instructors. A high standard is maintained by the character of the examinations held for selecting temporary employés. For example, in the examination for temporary geologic assistants held April 23 and 24, 1901, the applicants were obliged to meet the following requirements :

First. To write an essay of more than a thousand words, setting forth either the course and results of an original geologic investigation by the applicant or the main features of the geology of some State.

Second. To answer satisfactorily seven questions, so selected as to test the applicant's knowledge of the science of geology in general.

Third. To select one of the five specialties, stratigraphy, petrography, paleontology, physiography, and glaciology, and make clear the possession of an adequate knowledge thereof.

The weight given to the various subjects was as follows :

Geological essay, including composition and drawing.....	30 per cent.
General geology.....	15 per cent.
Special geology.....	25 per cent.
Education and experience.....	30 per cent.

Fifty-two persons took this examination, and of these forty-six made an average of more than 70 per cent. The successful applicants have received degrees for academic and graduate study from the following institutions of learning:

Harvard University.....	13
Johns Hopkins University.....	6
University of Chicago.....	6
Yale University.....	5
Cornell University.....	4
University of Wisconsin.....	2
University of California.....	2
University of Kansas.....	2
Stanford University.....	2
Iowa State College.....	2
Amherst College.....	2
Munich.....	2
Alfred University.....	1
Beloit College.....	1
Columbia University.....	1
Columbian University.....	1
Cornell College, Iowa.....	1
Denison University.....	1
Gates College.....	1
German Wallace College.....	1
Hamilton College.....	1
Heidelberg College, Ohio.....	1
Heidelberg, Germany.....	1
Indiana State University.....	1
Lafayette College.....	1
Lawrence Scientific School.....	1
Moore's Hill College.....	1
Ohio Wesleyan University.....	1
University of Illinois.....	1
University of Minnesota.....	1
University of Missouri.....	1
University of Nebraska.....	1
University of the City of New York.....	1
University of Oregon.....	1
University of South Carolina.....	1
Williams College.....	1

The total of forty-six successful applicants divides by State residence as follows:

Massachusetts.....	9
Illinois.....	7
New York.....	7
Iowa.....	3
Connecticut.....	2
Indiana.....	2
Missouri.....	2
Pennsylvania.....	2
South Carolina.....	2

California.....	1
Colorado.....	1
Kansas.....	1
Kentucky.....	1
New Jersey.....	1
Ohio.....	1
Oregon.....	1
Tennessee.....	1
Wisconsin.....	1
Wyoming.....	1

Of those who passed, forty have received appointments to temporary positions. It is probable that 50 per cent. of the number will become permanent members of the Survey; 38 per cent. already hold or will obtain positions as instructors in educational institutions, and the others will enter State surveys and private employment.

Of the temporary geologic force of the Survey other than those mentioned, and who receive pay only when actually employed, the majority are connected with institutions of learning, as follows:

Harvard University.....	4
University of Chicago.....	4
University of Wisconsin.....	3
Columbia University.....	2
Stanford University.....	2
Yale University.....	2
Amherst College.....	1
Clark University.....	1
Colby University.....	1
Johns Hopkins University.....	1
Ohio State University.....	1
University of Michigan.....	1
University of California.....	1
University of Virginia.....	1
University of West Virginia.....	1
University of South Dakota.....	1
Vanderbilt University.....	1
Williams College.....	1

The preceding statements illustrate the intimate relation existing between one division of one bureau of one department of the Government and the higher educational interests of the country. A close analysis of the personnel of other bureaus will doubtless show that the Government is thus indirectly doing a great work in fostering higher education and research, and it will

at the same time be seen that the educational institutions of the country are training men and women for the highest scientific and technical positions in the Government service.

The Association of Agricultural Colleges and Experiment Stations several years ago realized the importance of giving its students the training which would enable them to meet the conditions prevailing in Washington. A committee of graduate study in Washington was appointed in July, 1897.* In the following April this committee met in Washington to study the conditions under which work might be undertaken. In a report made in November, 1898, the committee said in part:

After long deliberation and full discussion your committee are unanimously of the opinion that the time is ripe for expeditious action.

The inquiries and investigations so far made lead the committee to the conclusion that it is entirely practicable to provide for the use of the Library of Congress and the collections of the Smithsonian Institution, the National Museum, and of the various scientific and other bureaus in the several departments of the general government, by graduate students of the land grant and other colleges, for study and research, and that it is also practicable to organize, coordinate, and direct such work so as to make it eminently effective.

* *Resolved*, That a committee of five be appointed by the President to investigate, consider, and, if practicable, devise a plan whereby graduate students of the land grant and other colleges may have access to and the use of the Congressional Library and the collections in the Smithsonian Institution, the National Museum, and the scientific bureaus of the various departments at Washington of the United States Government for the purposes of study and research, said plan to include suggestions as to the manner in which such work may be organized, coordinated, and directed to the best advantage; the composition and organization of such a staff as may be necessary to properly coordinate and direct such work, and also an outline of such legislation as may be necessary to effect the general purposes of this resolution. (Proc. Twelfth Annual Convention of the Assn. Amer. Agricultural Colleges and Experiment Stations, held at Wash., D. C., Nov. 15-17, 1898, being Bull. 65, Dept. Agriculture, p. 58.)

The committee has been greatly desirous that some existing agency be found to undertake such work of organization, coordination, and direction, and have naturally turned to the Smithsonian Institution as the one best fitted for the purpose.

The committee is unable, at the present time, to present a complete outline of the legislation necessary to effect the general purposes of the resolution. It submits tentatively, however, that Congress might be asked to provide for the establishment of an administrative office in Washington, preferably in the Smithsonian Institution, in which graduate students of the institutions we represent, and others as well, might be enrolled and directed to the appropriate departments (Bull. 65, Dept. Agriculture, pp. 61, 62).

In a report by the subcommittee of the committee of the National Educational Association on the establishment of a national university, we find that the active cooperation of the Smithsonian Institution is contemplated in the conduct of the proposed school or bureau, but that the committee of the regents of the Smithsonian Institution feel that the powers of the institution, as at present organized, are insufficient to embrace the work proposed.*

At a meeting of the Smithsonian regents held on January 24, 1900, Dr. Alexander Graham Bell introduced a resolution to the effect that Congress be asked to provide for an assistant secretary of the Smithsonian Institution in charge of research in the Government departments, etc. The resolution was referred to a committee, which, on January 23, 1901, reported a modified form of the original resolution. This modified form was adopted by the board of regents. It reads as follows:

In order to facilitate the utilization of the Government departments for the purpose of research, in extension of the policy enunciated by Congress in the Joint Resolution approved April 12, 1892:

Resolved, That it is the sense of the board that it is desirable that Congress extend this resolution so as to afford facilities for study to all properly qualified students or graduates of universities, other than those mentioned in the resolution, and provide for the appointment of an officer whose duty it shall be to as-

* SCIENCE, N. S., Vol. XI., March 16, 1900, pp. 410-414.

certain and make known what facilities for research exist in the Government departments, and arrange with the heads of the departments, and with the officers in charge of the Government collections, on terms satisfactory to them, rules and regulations under which suitably qualified persons might have access to these collections for the purpose of research with due regard to the needs and requirements of the work of the Government; and that it should also be his duty to direct, in a manner satisfactory to the heads of such departments and officers in charge, the researches of such persons into lines which will promote the interests of the Government and the development of the natural resources, agriculture, manufactures and commerce of the country, and (generally) promote the progress of science and the useful arts, and the increase and diffusion of knowledge among men.

This resolution referred the matter to Congress. Many members of both Houses doubt whether Congress has power under the Constitution to appropriate money raised by taxation for purposes of education, and nothing was done by Congress, as the resolution was not officially brought before it.

ORGANIZATION OF THE WASHINGTON MEMORIAL INSTITUTION.

At this point the Washington Academy of Sciences undertook to give the proposition to utilize the resources of the Government for higher education and research a practical form, independent of direct Government support or control. For several months the Academy had been conferring with the George Washington Memorial Association relative to erecting in Washington a memorial building to be dedicated to science, literature and the liberal arts. The president of the Academy suggested to the Memorial Association that it should so amend its act of incorporation that it could cooperate with the Academy in carrying out the objects common to both organizations. The suggested amendments were made, and an agreement was entered into substantially as follows:

The objects of the George Washington Memorial Association are, first, as implied

in its name, the creation of a memorial to George Washington; and second, as stated in its amended act of incorporation, the increase in the city of Washington of opportunities and facilities for higher education, as recommended by George Washington in his various annual messages to Congress, notably the first—*i. e.*, 'the promotion of science and literature,' substantially as set forth in his last will, and by and through such other plans and methods as may be necessary or suitable. The object of the Washington Academy of Sciences, the federated head of the scientific societies of Washington, is the promotion of science, the term 'science' being used in its general sense—'knowledge, comprehension of facts and principles.'

The two organizations agreed, first, that, although American universities have so developed since George Washington's time that they fulfill many of the objects of the national university outlined by him as desirable for the youth of the United States, there is still need of an organization in the city of Washington which shall facilitate the utilization of the various scientific and other resources of the Government for purposes of research, thus cooperating with all universities, colleges and individuals in giving to men and women the practical post-graduate training which cannot be obtained elsewhere in the United States and which is now available only to a limited degree in the city of Washington, and, second, that the best method of securing the objects for which both organizations stand is the establishment, within the district selected by Washington as a site for the permanent seat of Government of the United States, of an institution whose object shall be the realization of Washington's repeatedly expressed wish and recommendation that provision be made for the *promotion of science and literature*.

The membership of the Academy in-

cludes most of the leading scientific men of Washington and the country at large. The Academy, familiar with conditions in Washington and with the efforts of the committees of the Association of Agricultural Colleges and Experiment Stations and the National Educational Association, and knowing that the Smithsonian Institution would not, under its limitations, take an active part, realized that the time was opportune for a new organization. Its committee drafted and secured the passage of the act of Congress approved March 3, 1901. The committee next drafted a plan of organization, which was accepted by the Academy and Memorial Association. The plan was, in brief, as follows :

1. *Organization*.—A private foundation independent of Government support or control.

2. *Objects*.—(a) To facilitate the use of the scientific and other resources of the Government for research.

(b) To cooperate with universities, colleges and individuals in securing to properly qualified persons opportunities for advanced study and research.

3. *Government*.—The policy, control and management to vest in a board of fifteen trustees, and in addition there shall be an advisory board composed chiefly of heads of executive departments, bureaus, etc.

Articles of incorporation were then drawn up and executed, and were filed on May 20, 1901. They read as follows :

Articles of Incorporation, Washington Memorial Institution.

We, the undersigned, persons of full age and citizens of the United States, and a majority of whom are citizens of the District of Columbia, being desirous to establish and maintain, in the city of Washington, an institution in memory of George Washington, for promoting science and literature, do hereby associate ourselves as a body corporate, for said purpose, under the general incorporation acts of the Congress of the United States enacted for the District of Columbia ; and we do hereby certify in pursuance of said act as follows :

First. The name or title by which such institution shall be known in law is the Washington Memorial Institution.

Second. The term for which said institution is organized is nine hundred and ninety-nine years.

Third. The particular *business and objects* of the institution are : to create a memorial to George Washington, to promote science and literature, to provide opportunities and facilities for higher learning, and to facilitate the utilization of the scientific and other resources of the Government, for purposes of research and higher education.

Fourth. The number of its trustees for the first year of its existence shall be fifteen.

In testimony whereof we have hereto set our names and affixed our seals, at the city of Washington, in the District of Columbia, on the 16th day of May, 1901.

DANIEL C. GILMAN.	[SEAL.]
CHARLOTTE EVERETT HOPKINS.	[SEAL.]
C. HART MERRIAM.	[SEAL.]
GEORGE M. STERNBERG.	[SEAL.]
CHAS. D. WALCOTT.	[SEAL.]
CARROLL D. WRIGHT.	[SEAL.]

DISTRICT OF COLUMBIA, ss :

Be it remembered that on this 16th day of May, A. D. 1901, before the subscriber personally appeared the above-named Daniel C. Gilman, Charlotte Everett Hopkins, C. Hart Merriam, Geo. M. Sternberg, Chas. D. Walcott, and Carroll D. Wright, to me personally known and known to me to be the persons whose names are subscribed to the foregoing instrument of writing, and severally and personally acknowledged the same to be their act and deed for the uses and purposes therein set forth.

Given under my hand and official seal the day and year above written.

[SEAL.] (Signed) HERBERT W. GILL,
Notary Public.

On May 27 fifteen trustees were elected, and on June 3 the officers for the first year were chosen. Lists of these are given herewith :

Board of Trustees, Washington Memorial Institution.

1. Dr. Edwin A. Alderman, President Tulane University.
2. Dr. A. Graham Bell, Regent Smithsonian Institution.
3. Dr. Nicholas Murray Butler, Professor of Philosophy and Education, Columbia University.
4. Dr. C. W. Dabney, President University of Tennessee.
5. Dr. D. C. Gilman, President Johns Hopkins University.
6. Dr. A. T. Hadley, President Yale University.

7. Dr. William R. Harper, President University of Chicago.

8. Mrs. Phoebe A. Hearst, Regent University of California.

9. Mrs. Archibald Hopkins, President George Washington Memorial Association.

10. Dr. C. Hart Merriam, Chief United States Biological Survey.

11. Dr. Cyrus Northrop, President University of Minnesota.

12. Dr. H. S. Pritchett, President Massachusetts Institute of Technology.

13. Dr. George M. Sternberg, Surgeon-General United States Army.

14. Hon. Charles D. Walcott, President Washington Academy of Sciences, and Director United States Geological Survey.

15. Hon. Carroll D. Wright, Commissioner of Labor.

Officers of Washington Memorial Institution.

Daniel C. Gilman, director.

Charles D. Walcott, president board of trustees.

Nicholas Murray Butler, secretary board of trustees.

C. J. Bell, treasurer.

An advisory board also was selected, as follows :

President of the United States.

Chief Justice of the United States.

Secretary of State.

Secretary of the Treasury.

Secretary of War.

Secretary of the Navy.

Secretary of the Interior.

Secretary of Agriculture.

Postmaster-General.

Attorney-General.

Secretary of the Smithsonian Institution.

Commissioner of Education.

Librarian of Congress.

Commissioner of Labor.

Commissioner of Fish and Fisheries.

President of the Civil Service Commission.

President of the National Academy of Sciences.

President of the National Educational Association.

President of the Association of American Universities.

President of the Association of Agricultural Colleges and Experiment Stations.

Dr. Charles W. Eliot.

The duties of the director, as defined in the by-laws are as follows :

The director shall be the chief executive of the institution, and, under the guidance and control of the

executive committee, shall conduct its affairs. He shall make all arrangements for cooperation between the institution, on the one hand, and the Government, universities, colleges, learned societies, and individuals on the other, subject to the approval of the executive committee.

EXISTING FACILITIES FOR STUDY AND RESEARCH.

The policy of the Government, as expressed, is to aid in higher education and research by granting the use of such facilities as are at its command in the District of Columbia. The direct control of higher education has been relegated to the States, the Government aiding by grants of land, and in the case of technical education at agricultural experiment stations by grants of money.

The Government has carried on original research for its own purposes in the District of Columbia through grants of money to its various scientific and technical bureaus, notably those of the Department of Agriculture, the Coast and Geodetic Survey, the Geological Survey, the National Museum, the Bureau of Ethnology, the Fish Commission, the Bureau of Education, the Library of Congress, etc.

Of the total sum appropriated for the fiscal year 1901, at least 25 per cent., or \$2,020,000, may be regarded as expendable for scientific and research work and in the interest of higher education. The appropriations for the year are as follows :

Department of Agriculture :	
Weather Bureau	\$1,168,320
Bureau of Animal Industry	1,154,080
" " Plant Industry	204,680
" " Forestry	185,440
" " Chemistry	85,800
" " Soils	109,140
Division of Entomology	86,200
" " Biological Survey	32,800
Agricultural Experiment Stations....	739,000
Miscellaneous	222,000
	<hr/>
	\$3,937,410.00
War Department :	
Army Medical Museum and Library.....	25,000.00
Navy Department :	
Hydrographic Office	\$136,518.00
Naval Observatory	226,461.08
Nautical Almanac	15,900.00
	<hr/>
	378,879.08

Interior Department :	
Geological Survey	\$1,023,423.11
Bureau of Education	59,370.00
	1,082,793.11
Treasury Department :	
Coast and Geodetic Survey	\$830,345
Bureau of Standards	167,140
Marine Hospital	71,100
	1,068,585.00
Smithsonian Institution :	
National Museum	\$289,400
Bureau of American Ethnology	50,000
National Zoological Park	80,000
Astrophysical Observatory	12,000
International Exchanges	24,000
	455,400.00
Commission of Fish and Fisheries	543,120.00
Botanic Gardens	24,393.75
Library of Congress	565,345.00
Total	\$8,080,925.94

This is about ten cents per capita for the entire population.

Great collections of books, specimens, statuary, paintings, instruments, apparatus, etc., have been assembled in Washington.

Libraries.—Statistics of the principal libraries reveal the presence of a large number of books, maps and pamphlets, many collections of which are exceptionally complete in special lines of research, notably those of the Departments of State and Agriculture, the Geological Survey, the Naval Observatory, the Surgeon-General's Office, the Bureau of Education, the Museum of Hygiene, the Patent Office, the National Museum, and special collections in the Library of Congress. The principal libraries are here listed :

	<i>Pam-</i>	
	<i>Books.</i>	<i>phlets. Maps.</i>
Library of Congress.....	1,000,000*	55,700
“ “ Smithsonian Institution	250,000†	
“ “ U. S. Supreme Court....	80,000†	
“ “ Army Medical Museum.	135,058	229,546
“ “ Dept. of Agriculture....	68,000	
“ “ Bureau of Education..	81,872	140,004
“ “ Patent Office.....	74,140	
“ “ Department of State....	63,000	2,500
“ “ Geological Survey.....	47,600	77,027
“ “ National Museum.....	25,000	30,000
“ “ Coast and Geodetic Sur.	16,405	6,178
“ “ Weather Bureau	18,000	5,000
“ “ Museum of Hygiene....	11,969	

* Books and pamphlets.

† These figures are included in the 1,000,000 assigned to the Library of Congress.

Library of Hydrographic Office....	3,000	
“ “ Bureau of Ethnology...	12,000	4,000
“ “ Bureau of Statistics.....	6,000	5,000
“ “ Department of Justice..	30,000	
“ “ Department of Labor...	7,051	4,454
“ “ Corcoran Gallery of Art	2,500	
“ “ Treasury Department..	22,000	3,000
“ “ War Department.....	49,000	2,000
“ “ Navy Department.....	33,635	
“ “ Interior Department...	15,000	
“ “ Post Office Department.	12,000	
“ “ Light-House Board	5,000	
“ “ War Records Office.....	2,000	
“ “ Naval Observatory.....	20,000	4,000
“ “ Naut. Almanac Office..	2,200	2,500
	2,092,430	515,209
		109,885

Other libraries in the District bring the grand total to more than 2,500,000 volumes, 570,000 pamphlets, and 110,000 maps, assembled in large part by specialists in every field. All the libraries are accessible and are maintained at a high standard of efficiency.

Collections.—The collections of the National Museum, though inadequately housed and with insufficient laboratories for the work of the regular museum force, are, nevertheless, of such character and are so arranged for exhibition and study that they will be of great service to all who may wish to use them. Under the present organization of the museum there are three departments: Anthropology, Biology and Geology. All the exhibits are systematically classified and placed in immediate charge of specialists acquainted with the results of man's activity in almost every form in which such results admit of study and representative exhibition. As provided by statute, the collections made by the Geological and other surveys are deposited in the National Museum after they have been used by the organization which collected them. This has resulted in an immense accumulation of material, much of which has not yet been fully studied, and upon which, when sufficient laboratory space is provided, students can be employed under the oversight of the specialists in charge.

The collections of the Army Medical Museum have a world-wide reputation and contain a great quantity of unique and valuable material. There are large collections of living animals at the Zoological Park; and there is a fine series, illustrating fish culture, at the Fish Commission building. The museum of the Agricultural Department contains valuable material, especially the working collections of the different divisions, and the Botanic Gardens are capable of great development under scientific direction. To the student interested in the development of American inventive genius and the industries represented by patents the collection of models and drawings in the Patent Office offers exceptional opportunities. Mention should also be made of the collections of apparatus of various kinds in Government laboratories, and of the illustrations of the evolution of apparatus in the National Museum and Smithsonian Institution.

In art, while the collections are not so large as in other lines, yet there is a collection of excellent quality in the Corcoran Gallery of Art, which maintains a free school. In this school day and night classes are taught the arts of drawing and painting, free of tuition fees or charge of any kind. Up to the close of 1899, 844 pupils had received instruction in the day school and 1,483 in the night school.

The Naval Observatory has a good equipment, including a chart and a chronometer depot, an extensive collection of instruments used in taking astronomic photographs, a fine telescope and transit instruments used in carrying on its routine work.

The newly created National Bureau of Standards is to have buildings and a fine equipment of all necessary apparatus. When fully developed it will be second to none in the character and value of its scientific and practical work. The functions of

this bureau are defined in the organic act as follows :

The functions of the bureau shall consist in the custody of the standards; the comparison of the standards used in scientific investigations, engineering, manufacturing, commerce and educational institutions with the standards adopted or recognized by the Government; the construction, when necessary, of standards, their multiples and subdivisions; the testing and calibration of standard measuring apparatus; the solutions of problems which arise in connection with standards; the determination of physical constants and the properties of materials, when such data are of great importance to scientific or manufacturing interests and are not to be obtained of sufficient accuracy elsewhere.

Law and Diplomacy.—The State Department has accumulated a valuable library relating to international law. The law library of Congress contains more than 50,000 volumes exclusively legal in character, and accommodations are provided for students who wish to use it. The School of Diplomacy of Columbian University is one of the unique features of the educational organizations of Washington. The Supreme Court of the United States and the Court of Claims bring together the foremost American lawyers. There is also the Supreme Court of the District of Columbia, which has the common-law, equity, and probate jurisdiction of State courts, besides that of the circuit and district courts of the United States.

There are, of course, unequaled opportunities for studying the development of legislation and for meeting the leading statesmen and public men of the country.

Medicine.—The Army Medical Museum has one of the finest collections in existence of recent pathologic specimens. These, taken with the library of the Surgeon-General's Office, in the same building, afford a rare opportunity for the medical student. In the adjoining National Museum there is a most complete collection illustrating the *materia medica* of the United States and of foreign countries. There are also several

hospitals, at each of which clinical instruction is given.

Congress has enacted that these vast collections and resources shall be available for higher education and research, but it has not provided the machinery for making them practically available. As in the case of the grants of land to colleges, Congress provides facilities and indirectly the means, but it leaves to other agencies the task of devising ways and means to make them practically useful.

The Government is obliged to train most of its specialists. Opportunities for post-graduate study and research exist at a few of the strongest universities, colleges and technical schools of the country, but at best the training given, except in a few branches, is of a preparatory character. Most American youth who are ambitious to pursue higher study and research have little opportunity, owing largely to the fact that the instructor's duties leave him scarcely any time for research and practical work with the student. Post-graduate students seek instructors distinguished for research, even to the extent of undergoing many privations and leaving their country. In the city of Washington the Government has assembled the largest body of original investigators to be found in any one place in the world. Most of these investigators are willing to train suitably qualified students, because of the assistance the students can give them in the work they have in charge, the method being to have the students do actual, practical work, and not to instruct them in the ordinary sense of the word. An unofficial inquiry indicates the following as a possible number of instructors and students in the various departments and bureaus at Washington:

	Instructors.	Students.
1. History and diplomacy.....	1	5
2. Historical research.....	5	10
3. Library administration and methods	5	15

4. Statistics	2	5
5. Magnetism	1	2
6. Meteorology.....	5	15
7. Tides	1	2
8. National Standards (Bureau of).....
9. Astronomy	3	8
10. Physics.....	2	3
11. Hydrography	5	10
12. Cartography, etc.....	2	5
13. Topography	10	20
14. Chemistry	6	10
15. Mineral resources.....	1	5
16. Geology.....	10	17
17. Paleontology.....	5	7
18. Animal industry.....	10	25
19. Anthropology and ethnology.....	4	13
20. Zoology	34	50
21. Botany.....	11	25
22. Forestry.....	10	20
	133	272

With the development of a well-considered plan, just alike to the student and to the officers of the Government, the number of students—or, more strictly speaking, student assistants—would increase from year to year. Most of the students would naturally come from institutions of learning; in all such cases the student should be certified to the director of the Washington Memorial Institution, and finally certified back to the parent institution after completing his work, such certificate to be based on the work done and the proficiency made. In the case of individual students not connected with any institution, let each prove his capacity to profit by the opportunities, and then accredit him to the special officer who has charge of the field of work in which he may wish to study; on satisfactory completion of the work undertaken, the certificate of the Washington Memorial Institution might be addressed ‘*To whomsoever it may concern.*’ Students working in Government laboratories, museums and libraries would be subject to the rules obtaining therein.

It is the belief of many acquainted with the educational system of the country that

the policy above outlined will result in a body of trained students, ready for expert work, many of whom will undoubtedly enter the government service, while others will become instructors in institutions of learning or be engaged as experts in private capacity. This will avoid competition with other institutions, will give most valuable training and practical experience to students, and will be especially helpful to instructors in educational institutions, who might wisely be sent for six months or a year to Washington, as at present some are sent abroad. There should be no thought of providing a general or liberal course of education. Coming as student assistants, there should be opportunities and encouragement only on clearly defined lines of study and investigation. There are many large and small problems to be worked out by the officers of the Washington Memorial Institution, but with the skilled educator and organizer now at its head as director their successful solution is only a matter of time. It is anticipated that the Washington Memorial Institution will, under the direction of Dr. Gilman, begin its work by November 1, 1901.

The Government's part in the work, when once under successful headway, will be to enlarge the quarters of the various bureaus concerned. This will be necessary eventually even if no student assistants are provided for. The Government has done its part nobly so far. It is now for the educational institutions of the country to come forward and assist by setting a high standard of scholarship for admission to the privilege of becoming a student assistant in the Government bureaus. Only students of the type of those who win fellowships or excel in ability should be certified or accepted.

The Washington Memorial Institution should, and I believe will, maintain a standard that will meet the approval of our

colleges and universities. It should occupy a most important place in the great educational work of the country. With the hearty cooperation of our collegiate institutions and of the officers of the Government, there is little question that it will ultimately become the federated head and clearing-house of all the higher educational interests of the country.

The relations of the National Government to higher education and research are intimate and complex; but the complexities are already partially resolved, the present is auspicious, and the future outlook is most promising. Long ago the nation recognized its obligation 'to promote a higher and more extended policy than is embraced in the protection of the temporal interests and political rights of the individual.' The action of Congress in the present year in opening the Government bureaus at Washington for study and research is a long stride forward, and, if carried out in good faith must result in another and higher standard for American endeavor.

CHARLES D. WALCOTT.

U. S. GEOLOGICAL SURVEY.

THE ROYAL SOCIETY OF CANADA.

THE twentieth general meeting of the Royal Society of Canada was held in Ottawa, May 21, 22 and 23, 1901. This is essentially a national institution. It was founded in 1882 by the Marquis of Lorne, now His Grace the Duke of Argyll. The Society is divided into *four* sections:

- I. French Literature, History and allied subjects.
- II. English Literature, History and allied subjects.
- III. Mathematical, Physical and Chemical Sciences.
- IV. Geological and Biological Sciences.

The Society met this year under the presidency of Dr. Louis Honoré Fréchet, C.M.G., who delivered his inaugural address, 'Race and Language Problem in